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A WINTER ROADSIDE SURVEY OF HAWKS IN EASTERN NEMAHA COUNTY, NEBRASKA

Abstract

During the winters of 1980-81 and 1981-82 roadside surveys of hawks were conducted on 76 square miles (196.8 square kilometers) of Nemaha County, Nebraska. Forty surveys were conducted each winter to acquire baseline data on distribution and populations. Ten species were observed, with the Red-tailed Hawk (49.7%) and the American Kestrel (21.5%) comprising more than 70 % of all sightings. Population estimates for each species were determined by using square mile extrapolation and the bounded count method. Intervals of confidence were calculated in an attempt to determine upper and lower winter population limits.

Methods

The two-year roadside survey covered 1,712 miles in the north-eastern corner of Nemaha County. The study area is bordered on the east by the Missouri River, on the north by the Otoe County line, and on the west and south by highways 73/75 and 136 respectively.

The 76 square mile area involved is divided into three major geographic units: 1) the Missouri River floodplain comprises approximately 16% of the land mass and is spotted with immature floodplain woodlots of various sizes: 2) the loess bluffs deciduous forest (14%) is an oak-hickory complex that provides considerable habitat for perching and nesting; and 3) the agricultural upland is composed of cultivated land, pasture, woodlots, and riparian woodlands. The upland comprises approximately 70% of the study area. This geographical diversity provides a variety of habitats for our birds of prey.

The area was divided into five surveys that averaged 21.4 miles. Each route was surveyed eight times per year and was structured to reduce the possiblity of recounting individual birds. The initial surveys ran from 20 October 1980 to 27 March 1981. During the following year the surveys commenced on 12 October 1981 and ended on 28 March 1982. The initiation of the surveys was determined mainly by leaf fall and subsequent surveys were conducted as environmental conditions allowed. The winter of 1981-82 was much more severe than in 1980-81, causing periods of forced idleness. However, all forty surveys were completed by the end of March.

Identification was aided by using a 15-60x terrestrial telescope and 10-24x binoculars. Sightings were plotted on individual survey maps and later transferred to master copies by species.

Results and Discussion

The purpose of our study was to accumulate data on all hawk species utilizing the eastern Nebraska habitat and to estimate their winter populations via the roadside survey. This data will be used to monitor changes in populations that may be directly related to loss of habitat. According to a study by Pappas, *et al*, 1982, tree cover in Nemaha County has decreased by 35 percent in the last 25 years. This type of habitat depletion must be monitored in an attempt to maintain and enhance suitable habitat.

Data was accumulated on numbers sighted, perch choice, and geographic distribution. Calculations include a square mile extrapolation as introduced by Craighead and Craighead (1956). In this method, it is assumed that one-quarter mile is surveyed on each side of the roadway and extrapolation results in a population estimation. The resultant figure is assumed to be a minimum since the internal areas of sections are not adequately surveyed using this method.

A second estimate of population was determined by using the bounded count method as described by Overton (1971). The bounded count is a method in which a series of population counts is made with the possibility, however remote, that all individuals may be counted during a single outing. The highest figure obtained during the counting period becomes the minimum estimate. The maximum figure is obtained by using a theorum derived by Quenouilli (1956) at 95% probability. These two figures are then used to establish confidence limits. All population estimates used in the text are those calculated using the bounded counts.

Using the data gathered, a short discussion of each species will follow.

Table 1

Survey Data by Species

	No. sighted		% of total		2 year average	
	80-81	81-82	80-81	81-82	No.	%
Red-tailed Hawk	199	138	56.4	43.1	169	49.7
American Kestrel	50	95	14.2	29.7	73	21.5
Swainson's Hawk	26	14	7.4	4.4	20	5.9
Northern Harrier	16	18	4.5	5.6	17	5.0
Rough-legged Hawk	9	13	2.6	4.1	11	3.2
Sharp-shinned Hawk	2	1	0.6	0.3	2	0.6
Cooper's Hawk	-	2	-	0.6	1	0.3
Broad-winged Hawk	1	-	0.3	-	1	0.3
Ferruginous Hawk	1	-	0.3	-	1	0.3
Merlin	1	-	0.3	-	1	0.3
Unidentified Falcon	1	2	0.3	0.6	2	0.6
Unidentified Hawk	47	37	13.3	11.6	42	12.4
Total	353	320			340	

Red-tailed Hawk: As in many other areas, our most abundant species is the Red-tailed Hawk (Table 1), comprising 49.7% of all sightings. Nearly half of the 337 Red-tails seen were in the upland, but they are common in all habitats. Of the perching Red-tails observed (Table 2), 80% were using trees which indicates close ties to and continuous use of our forested habitat.

The bounded count method of population estimation (Table 3) was used to calculate the winter Red-tail numbers at 55 which is .72 per square mile (.28 per square kilometer).

American Kestrel: The predominant falcon in the area is the American Kestrel. Nearly always sighted perching (Table 2), this species was seen 145 times, representing 21.5% of the 673 hawks seen. The Kestrel is a year-long resident associating with the woodlots of the upland about 77% of the time, but is found in all topographic areas. The winter population is estimated at 36. (Table

3).

Swainson's Hawk: Our next most numerous species was the Swainson's Hawk, with 40 sightings over the winter period. With this raptor, as with many, positive identification is, at best, difficult. The numbers of these hawks seen in our study seem to be out of proportion with the number seen in the midwest in recent years. Therefore, we conclude that our population estimate is high and that future studies should give us a more realistic picture concerning this raptor.

Table 2

	Sighting Situation			
	No. Perching	% Perching	No. Flying	% Flying
Red-tailed Hawk	195	58	142	42
American Kestrel	128	88	17	12
Swainson's Hawk	27	68	13	32
Northern Harrier	2	6	32	94
Rough-legged Hawk	16	73	6	27
Sharp-shinned Hawk	2	67	1	33
Cooper's Hawk	1	50	1	50
Broad-winged Hawk	-	-	1	100
Ferruginous Hawk	1	100	-	-
Merlin	-	-	1	100

Northern Harrier According to the Corps of Engineers Wildlife Mitigation Plan of 1980, this species is endangered in Iowa. We have identified both sexes in two very different habitats. The more typical environment is the marshy lowlands, but we also observed, on several occasions, a pair in the upland farming area southwest of Peru. The Northern Harrier was seen on the floodplain and in the uplands, in a ration of 2:1 in favor of the former.

The bounded count estimate of 16 (Table 3), although within the confidence interval of 9 - 133 (Table 3), seems high for two reasons. There is a limited amount of lowland habitat which is

Table 3

	Population Estimates		
	Square Mile Extrapolation	Bounded Count	
		Estimate	Confidence Interval
Red-tailed Hawk	32	55	39-200
American Kestrel	13	36	20-186
Swainson's Hawk	3	18	11-102
Northern Harrier	3	16	9-133
Rough-legged Hawk	2	11	7-102
Sharp-shinned Hawk	2	3	2-30
Cooper's Hawk	1	2	1-20
Broad-winged Hawk	1	1	1-10
Ferruginous Hawk	1	1	1-10
Merlin	1	1	1-10
Total	59	144	

frequented by this species, and our sightings were consistently in the same geographic areas, indicating that we were probably sighting the same bird(s).

Rough-legged Hawk: Rough-legged Hawks were seen twenty-two times comprising 3.2% of the total. These hawks are strictly winter visitors with sightings as early as October and as late as April. Their winter numbers are estimated at 11 (Table 3).

Sharp-shinned Hawk: The Corps of Engineers (1980) also report that the Sharp-shinned Hawk is considered to be extirpated in Iowa. Substantial habitat exists for this species in the upland where all of the winter sightings occurred. The bounded count estimate of three (Table 3) is probably too low because of the dense forest habits of this raptor.

Cooper's Hawk: Two sightings of this species occurred during the survey period, both on the edge of the deep forest environment. Our study area does have sufficient forest for this species to maintain a small winter population.

Broad-winged Hawk: Another rarely sighted raptor in the area for which there is suitable habitat is the Broad-winged Hawk. According to Johnsgard (1979), this hawk has nested in the Missouri Valley of eastern Nebraska. The study area does have deep forest in association with water which is the preferred habitat of this species. Our data indicates a small winter population.

Merlin and Ferruginous Hawks: These two species are occasional visitors to this area but are more typically found in other environments. Both of the sightings were during the migratory periods (Merlin: 28 October 1980 and Ferruginous: 8 March 1981).

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